WHAT IS CLAIMED IS:

1. A monodisperse population of nanocrystals comprising:

a plurality of nanocrystal particles, wherein each particle includes a core including a first semiconductor material and an overcoating including a second semiconductor material uniformly deposited on the core, wherein the first semiconductor material and the second semiconductor material are the same or different,

wherein the monodisperse population emits light in a spectral range of no greater than about 60 nm full width at half max (FWHM) when irradiated.

2. The monodisperse population of claim 1, wherein the monodisperse population emits light in a spectral range of no greater than about 40 nm full width at half max (FWHM) when irradiated.

3. The monodisperse population of claim 1, wherein the monodisperse population emits light in a spectral range of no greater than about 30 nm full width at half max (FWHM) when irradiated.

4. The monodisperse population of claim 1, wherein the monodisperse population exhibits photoluminescence having a quantum yield of greater than 30%.

5. The monodisperse population of claim 4, wherein the monodisperse population exhibits photoluminescence having a quantum yield of greater than 40%.

6. The monodisperse population of claim 1, wherein the spectral range has a peak in the range of about 470 nm to about 620 nm.

7. The monodisperse population of claim 1, wherein the cores of the plurality of nanocrystal particles have diameters having no greater than 10% rms deviation.

8. The monodisperse population of claim 7, wherein the cores of the plurality of nanocrystal particles have diameters having no greater than 5% rms deviation.

9. The monodisperse population of claim 7, wherein the cores have a mean diameter in the range of about 20 Å to about 125 Å.

10. The monodisperse population of claim 1, wherein the overcoating includes greater than 0 to about 5.3 monolayers of the second semiconductor material.

11. The monodisperse population of claim 10, wherein the second semiconductor material is ZnS or ZnSe.

12. The monodisperse population of claim 10, wherein the overcoating includes less than about one monolayer of the second semiconductor material.

13. The monodisperse population of claim 10, wherein the overcoating includes in the range of about one to about two monolayers of the second semiconductor material.

14. The monodisperse population of claim 1, wherein each particle of the monodisperse particle population further comprises an organic layer on the outer surface of the particle.

15. The monodisperse population of claim 14, wherein the organic layer includes a moiety selected to provide a stable suspension or dispersion with a suspension or dispersion medium.

16. The monodisperse population of claim 14, wherein the organic layer includes a moiety selected to exhibit affinity for a surface of the nanocrystal particle.

17. The monodisperse population of claim 16, wherein the moiety includes a short-chain polymer terminating in a moiety having affinity for a suspension or dispersion medium.

18. The monodisperse population of claim 1, wherein the first semiconductor material is selected from the group consisting of CdS, CdSe, CdTe, and mixtures thereof.

19. The monodisperse population of claim 18, wherein the second semiconductor material is selected from the group consisting of ZnS, ZnSe, CdS, CdSe, and mixtures thereof.

20. The monodisperse population of claim 1, wherein the second semiconductor material is selected from the group consisting of ZnS, ZnSe, CdS, CdSe, and mixtures thereof.

21. The monodisperse population of claim 1, wherein the first semiconductor material is CdSe and the second semiconductor material is ZnS.

22. The monodisperse population of claim 21, wherein the overcoating includes greater than 0 to about 5.3 monolayers of the second semiconductor material.

23. The monodisperse population of claim 21, wherein the overcoating includes less than about one monolayer of the second semiconductor material.

24. The monodisperse population of claim 21, wherein the overcoating includes about one to about two monolayers of the second semiconductor material.

25. A suspension of nanocrystals comprising:

a plurality of nanocrystal particles, wherein each particle includes a core including a first semiconductor material, and an overcoating including a second semiconductor material uniformly deposited on the core, wherein the first semiconductor material and the second semiconductor material are the same or different,

wherein the cores of the plurality of nanocrystal particles have diameters having no greater than 10% rms deviation.

26. The suspension of claim 25, wherein the rms deviation is no greater than 5%.

27. The suspension of claim 25, wherein the cores have a mean diameter in the range of about 20 Å to about 125 Å.

28. The suspension of claim 25, wherein the overcoating includes greater than 0 to about 5.3 monolayers of the second semiconductor material.

29. The suspension of claim 28, wherein the second semiconductor material is ZnS or ZnSe.

30. The suspension of claim 28, wherein the overcoating includes less than about one monolayer of the second semiconductor material.

31. The suspension of claim 28, wherein the overcoating includes about one to about two monolayers of the second semiconductor material.

32. The suspension of claim 25, wherein each particle of the monodisperse particle population further comprises an organic layer on the outer surface of the particle.

33. The suspension of claim 32, wherein the organic layer includes a moiety selected to provide a stable suspension or dispersion with a suspension or dispersion medium.

34. The suspension of claim 32, wherein the organic layer includes a moiety selected to exhibit affinity a surface of a nanocrystal.

35. The suspension of claim 34, wherein the moiety includes a short-chain polymer terminating in a moiety having affinity for a suspension or dispersion medium.

36. The suspension of claim 25, wherein the first semiconductor material is selected from the group consisting of CdS, CdSe, CdTe, and mixtures thereof.

37. The suspension of claim 36, wherein the second semiconductor material is selected from the group consisting of ZnS, ZnSe, CdS, CdSe, and mixtures thereof.

38. The suspension of claim 25, wherein the second semiconductor material is selected from the group consisting of ZnS, ZnSe, CdS, CdSe, and mixtures thereof.

39. The monodisperse population of claim 25, wherein the first semiconductor material is CdSe and the second semiconductor material is ZnS.

40. The suspension of claim 39, wherein the overcoating includes greater than 0 to about 5.3 monolayers of the second semiconductor material.

41. The suspension of claim 39, wherein the overcoating includes less than about one monolayer of the second semiconductor material.

42. The suspension of claim 39, wherein the overcoating includes about one to about two monolayers of the second semiconductor material.

43. A method of preparing a monodisperse population of nanocrystals capable of light emission, comprising:

introducing into a coordinating solvent a plurality of cores, each core including a first semiconductor material, and a precursor capable of thermal conversion into a second semiconductor material, the cores emitting light in a spectral range of no greater than about 60 nm full width half max (FWHM) when irradiated,

wherein the coordinating solvent is maintained at a temperature sufficient to convert the precursor into the second semiconductor material yet insufficient to substantially alter the monodispersity of the cores,

wherein the second semiconductor material has a band gap greater than the first semiconductor material, and

whereby the cores become individually overcoated with the second semiconductor material to form a monodisperse population of nanocrystals.

44. The method of claim 43, further comprising monitoring the monodispersity of the population of nanocrystals.

45. The method of claim 44, further comprising increasing the temperature of the coordinating solvent when monitoring indicates overcoating appears to stop.

46. The method of claim 44, further comprising lowering the temperature of the coordinating solvent when monitoring indicates a spreading of the size distribution of the population of nanocrystals.

47. The method of claim 43, wherein the first semiconductor material is selected from the group consisting of CdS, CdSe, CdTe, and mixtures thereof.

48. The method of claim 43, wherein the second semiconductor material is selected from the group consisting of ZnS, ZnSe, CdS, CdSe and mixtures thereof.

49. The method of claim 43, wherein the cores have a mean diameter in the range of about 20 Å to about 125 Å.

50. The method of claim 43, further comprising exposing the monodisperse population of nanocrystals to an organic compound having affinity for a surface of a nanocrystal, whereby the organic compound displaces the coordinating solvent.

51. The method of claim 43, wherein the spectral range is no greater than about 40 nm full width at half max (FWHM).

52. The method of claim 43, wherein the population of nanocrystals exhibit photoluminescence having a quantum yield of greater than about 30%.

53. A method of preparing a monodisperse population of nanocrystals capable of light emission, comprising:

introducing into a coordinating solvent a plurality of cores, each core including a first semiconductor material, and a precursor capable of thermal conversion into a second semiconductor material, the plurality of cores having diameters having no greater than 10% rms deviation,

wherein the coordinating solvent is maintained at a temperature sufficient to convert the precursor into the second semiconductor material yet insufficient to substantially alter the

dispersity of the cores,

wherein the second semiconductor material has a band gap greater than the first semiconductor material, and

whereby the cores become individually overcoated with the second semiconductor material to form a monodisperse population of nanocrystals.

54. The method of claim 53, further comprising monitoring the monodispersity of the population of nanocrystals.

55. The method of claim 53, wherein the first semiconductor material is selected from the group consisting of CdS, CdSe, CdTe, and mixtures thereof.

56. The method of claim 53, wherein the second semiconductor material is selected from the group consisting of ZnS, ZnSe, CdS, CdSe and mixtures thereof.

57. The method of claim 53, wherein the cores have a mean diameter in the range of about 20 Å to about 125 Å.

58. The method of claim 53, further comprising exposing the monodisperse population of nanocrystals to an organic compound having affinity for a surface of a nanocrystal, whereby the organic compound displaces the coordinating solvent.

59. The method of claim 53, wherein the cores, when irradiated, emit light in a spectral range of no greater than about 60 nm full width half maximum (FWHM).

60. A method of preparing a monodisperse population of nanocrystals capable of light emission, comprising:

contacting a plurality of cores, each core including a first semiconductor material, with a precursor capable of thermal conversion into a second semiconductor material in a coordingating solvent, the plurality of cores having diameters having no greater than 10% rms deviation, and

overcoating each core individually with a second semiconductor material without substantially altering the monodispersity of the cores.

61. A family of nanocrystal dispersions comprising:

a first suspension or dispersion of nanocrystals, wherein each nanocrystal in the first suspension or dispersion includes a core including a first semiconductor material and an overcoating including a second semiconductor material uniformly deposited on the core; and

a second suspension or dispersion of nanocrystals, wherein each nanocrystal in the second suspension or dispersion includes a core including a third semiconductor material and an overcoating including a fourth semiconductor material uniformly deposited on the core,

wherein the first, second, third and fourth semiconductor materials are each, individually, the same or different,

wherein the first suspension or dispersion, when irradiated, emits light in a spectral range of no greater than about 60 nm full width at half max (FWHM), the light having a first maximum wavelength of light emission.

62. The family of claim 61, wherein the second suspension or dispersion, when irradiated, emits light having a second maximum wavelength of light emission, the first maximum wavelength and the second maximum wavelength being different.

63. The family of claim 62, further comprising a third suspension or dispersion of nanocrystals having a third maximum wavelength of light emission different from the first maximum wavelength and the second maximum wavelength.

64. The family of claim 63, further comprising a fourth suspension or dispersion of nanocrystals having a fourth maximum wavelength of light emission different from the first maximum wavelength, the second maximum wavelength, and the third maximum wavelength.

65. The family of claim 64, further comprising a fifth suspension or dispersion of nanocrystals having a fifth maximum wavelength of light emission different from the first

maximum wavelength, the second maximum wavelength, the third maximum wavelength, and the fourth maximum wavelength.

66. The family of claim 65, further comprising a sixth suspension or dispersion of nanocrystals having a sixth maximum wavelength of light emission different from the first maximum wavelength, the second maximum wavelength, the third maximum wavelength, the fourth maximum wavelength, and the fifth maximum wavelength.

67. The family of claim 62, wherein each maximum wavelength of light emission of the first suspension or dispersion and the second suspension or dispersion is between 470 nm and 620 nm.

68. A method of making a family of nanocrystal dispersions comprising:

overcoating a first monodisperse population of nanocrystal cores; and

overcoating a second monodisperse population of nanocrystal cores,

wherein each monodisperse population of nanocrystal cores, when irradiated, emits light in a spectral range of no greater than about 60 nm full width half max (FWHM), and wherein the first monodisperse population of cores has a maximum wavelength of light emission different from a maximum wavelength of light emission of the second monodisperse population.

69. The method of claim 68, wherein the maximum wavelengths of light emission of the first monodisperse population and the second monodisperse population differ by at least 30 nm.